

NASA Space Communications and Navigation

Keeping the Universe Connected

spacecomm.nasa.gov

☒ Transparency ☒ Participation ☒ Collaboration

NASA's reliable space communications and navigation (SCaN) networks are the backbone of all of NASA's space missions, providing the critical communication services for all Earth, space science, and human space flight missions. This includes all of the telemetry, tracking, and commanding (TTandC) required by each spacecraft to transfer key data to the ground systems to manage space operations, as well as the voice communications with the human space flight missions and data transfer for all of the Earth and space science missions. These networks enable NASA to show the live broadcasts to the public of exciting NASA events including launches, astronaut extra-vehicular activity (EVAs), life and work on-board the International Space Station (ISS), and the Mars Rovers' exploration of our neighboring planet.

Overview

NASA's space communications and navigation services are provided by three integral networks:

- The Near Earth Network (NEN).
- The Space Network (SN) and its related Tracking and Data Relay Satellite System (TDRSS) of geo-stationary satellites.
- The Deep Space Network (DSN).

The NEN, which includes commercial services obtained on a per pass basis, provides orbital communications support for near-Earth orbiting customer platforms via various NASA ground stations. The SN provides communications support to spacecraft in Earth vicinity, including the Space Shuttle and the ISS. The DSN is an international network of large antennas and communication facilities that supports interplanetary spacecraft missions, and radio and radar astronomy observations for the exploration of the solar system and the universe. All of NASA's live footage from space is provided through these networks.

Deep Space Network

deepspace.jpl.nasa.gov



Sunset shot of the 70m antenna at Goldstone, California.

The Goldstone Deep Space Communications Complex, located in the Mojave Desert in California, is one of three complexes that comprise NASA's Deep Space Network (DSN). The DSN provides radio communications for all of NASA's interplanetary spacecraft and is also used for radio astronomy and radar observations of the solar system and the universe.

NASA's amazing successes, like the landing of the Mars Rovers and their journeys across the red planet, as well as the tragedies during our history have all been brought to the American people live and unfiltered through these communication networks. The Earth science data from the many spacecraft studying our home planet are all made available to scientists through these networks, to learn about our climate and help protect our home planet.

How This Fits into Open Government

NASA's SCaN networks promote transparency by providing the live video feeds of all major human spaceflight operations, such as launch, landing, docking, undocking, all space walks, major on-orbit assembly operations, and extensive coverage of daily life on-board the ISS. NASA is working to expand the range of activities in which people can participate. NASA works closely with many international space agencies to coordinate critical space communications standards and spectrum requirements necessary for successful communications, without external interferences, as well as to find areas of collaboration and cooperation. Such global standards will aid in interoperability between systems and ease the transition for commercial entities to differentiate.

NASA actively participates with the Department of Commerce's National Telecommunications and Information Administration and the Department of State to develop United States positions on the critical radiofrequency spectrum assignments needed for all of NASA's missions, and negotiates those positions within appropriate international fora, such as the World Radiocommunications Conference. NASA also participates in other international collaborative organizations such as the Interagency Operations Advisory Group.

Open Government Goals

- Three months
 - Participate in the Discovery Channel's program about the bearings replacement on the 70-meter "Mars antenna" at Goldstone Deep Space Communications Complex in Mojave Desert, CA.

Live Space Station Video

www.nasa.gov/ntv (click on 'Live Space Station Video' Channel on the Right)



The Soyuz TMA-13 spacecraft docks at the International Space Station on October 14, 2008.

Since March 2009, NASA has begun streaming video online from the International Space Station (ISS). Live ISS video includes internal views from cameras in the ISS's Destiny Laboratory and Harmony module when the resident astronauts are on duty. Earth views from external cameras on the station's structure will be available during crew off-duty periods. Television from the station is available only when the complex is in contact with the ground through its high-speed communications antenna and NASA's Tracking and Data Relay Satellite System (TDRSS).

- Six months
 - Collaborate with United States Air Force to develop video about the many benefits of GPS to NASA and its missions.
- One year
 - Provide live downlink of some ISS data as part of NASA exhibits.
- Two years
 - Develop optical communications, which would enable high definition broadcasts from space.

Useful Links

1. Tracking and Data Relay Satellite System (TDRSS): scp.gsfc.nasa.gov/tdrs/
2. Deep Space Network: deepspace.jpl.nasa.gov/dsn/gavrt/index.html
3. Interagency Operations Advisory Group: www.ioag.org
4. Data Standards:
www.spacecomm.nasa.gov/spacecomm/programs/data_standards.cfm
5. Many SCaN Links: www.spacecomm.nasa.gov/spacecomm/Links/